Title: *Ionospheric Plasma Response to Sub Auroral Plasma Drift Structures*

Cluster: *Cross-Theme Theory and Data Analysis/SECTP*

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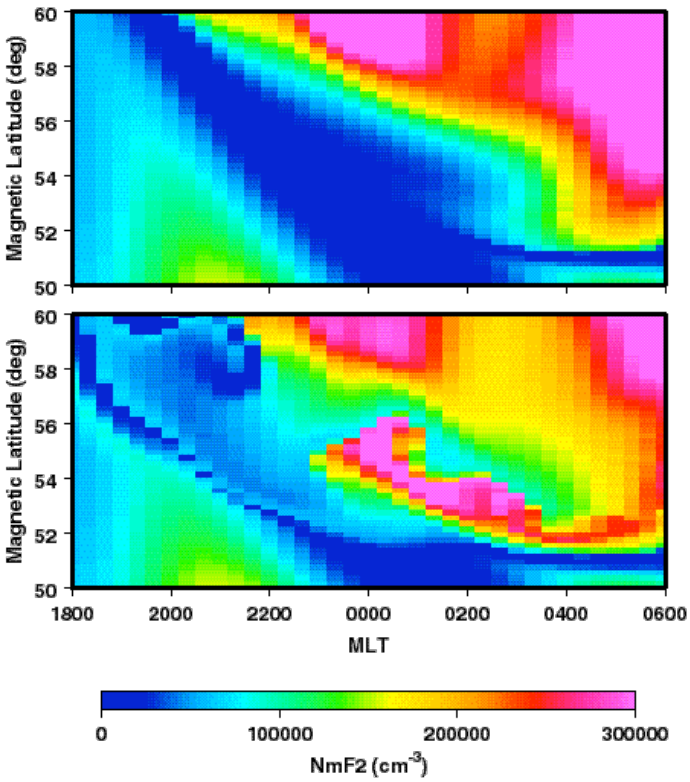
- **Significant Meso-Scale Structuring of the Middle Latitude F-Region Produced by Electrodynamic Coupling with the Inner Magnetosphere.**

The Earth's middle latitude ionosphere and the high altitude inner magnetosphere are electrodynamically coupled by spatially confined processes not well understood, but empirically identified and referred to as Sub Auroral Polarization Streams (SAPS). The USU SECTP group, using their Time Dependent Ionospheric Model (TDIM) in high-resolution mode, have found that these SAPS produce prominent meso-scale structures in the F-region of the ionosphere. These newly predicted density structures and their associated steep horizontal density gradients are Space Weather features that could have significant impacts on systems, like the Wide Area Augmentation System (WAAS) network that is to provide the airline industry with very accurate GPS-measured position accuracies. Such structures are also objects to be investigated by NASA's LWS Ionosphere-Thermosphere Storm Probe Mission. Furthermore, these ionospheric plasma structures are the near earth-counterparts of plasmapause flux tube structures identified as magnetospheric detached plasma patches – a plasma phenomenon that is the object of ongoing studies by observations from NASA's IMAGE satellite.



F-Region peak electron density distributions computed with the inclusion of SAPS (bottom panel) and without (top panel). The SAPS convection electric field employed was obtained from observations made by the Millstone Hill incoherent scatter radar (J. Foster and co-workers, private communication, 2002).

Sojka et al., A mid-latitude space weather hazard driven directly by the magnetosphere, *J. Atmos. Solar Terr. Phys., 64*, 687, 2002; and on-going work.